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A DETAILED SEISMIC BEHAVIOURAL STUDY OF FIRST SOFT STOREY IN R.C.C BUILDING BY USING E-TABS

Lavanya P[1], Monisha M[2], Sathiya K[3], Vanitha R[4], Final Year,

Ramya S, Assistant Professor,

Civil Department, Bharathiyar Institute of Engineering for women,

Deviyakurichi, India.

k.sakthi511298@gmail.com, monishacivil53@gmail.com.

ABSTRACT

With urbanization and rising unbalance of required space to accessibility, it is becoming very important to provide open earth storey in commercial and residential buildings. Functional and Social need to provide car parking space at ground level and for offices open story at different level of organization far out-weighs the warning against such buildings from engineering community. These provisions reduce the inflexibility of the lateral load resisting structure and a progressive subside becomes inescapable in a strict earthquake for such buildings due to elastic storey. Soft storey behavior reveal higher stresses on the columns and the column are unsuccessful as the forced hinges are not formed on predetermined position. Therefore, the vulnerability of soft storey consequence has cause structural engineers to rethink the design of a soft storey structure in areas of far above the ground seismicity. The near analytical studies investigate the influence of some parameters on activities of a building with elastic storey. With the availability of fast computers, so that software usage in civil engineering has really reduced the complexities of different aspect in the analysis and plan of projects. The modeling of the whole building is carried out by the computer program ETABS. Parametric studies on Time occasion, displacement, inter storey drift and storey shear have be carried out by equivalent static analysis or response spectrum analysis to scrutinize the influence of these parameter on the performance of buildings by means of soft storey. The selected structure shall be analyzed from side to side two numerical model.

Keywords— Multistory building, Seismic Analysis, Storey float, Storey shear, Soft story, equal static analysis, Storey dislocation, Time stage Forces, winding moment.

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INTRODUCTION

Open ground storey is adapted to house parking, reception lobby etc. Soft storey at different levels are constructed for office, communication hall etc. A yielding storey is also acknowledged as a weak storey or stilt storey. It is a storey in a building with significantly less stiffness than the stories above or beneath. It also has inadequate shear resistance and ductility to refuse to accept the earthquake forces. These features are highly discarded especially when the structure is constructing in high seismic zone. IS 1893:2002 defines the elastic story as the single in which the lateral stiffness is less than 70% of that in the story directly higher than, or less than 80% of combined stiffness of three stories above. The Masonry infill walls are normally used in the structure and measured as a non-structural component. Below the seismic excitations, the presentation of structure is mostly affected by such non-structural elements. The stiffness contribution of infill walls can be careful in analysis by equivalent strut approach. The soft storey has insufficient lateral load fight due to its reduced stiffness. In the their study, a parametric study is perform on the example building with soft storey and it is future to describe the performance characteristics such as bend, time period, services, bending moments and drift. Rigid end relations are measured for frame members and effect of soil structure interaction is unobserved. The evaluation of representation through shear wall, bracing and model with higher soft storey along with ground soft storey is obtainable in this paper. The project aim to highlight the deliberation of open storey in the analysis and then finding the measures to reduce the effect of soft storey. Equal static analysis is performing for the models of structure using ETABS analysis package.

PROBLEM STATEMENT

The soft storey undergoes reasonably larger storey float compared to the storey above. The force demand on the column at earth soft storey is large, due to rough storey stiffness and rough lateral force sharing along the height of the soft store. Soft storey is subjected to larger lateral services, Safety and minimum damage level of a structure might be the prime essential of building with soft stories. To get together these supplies, the structure should have sufficient lateral strength, surface stiffness, and sufficient ductility, for the same, diverse actions may be adopt.

Soft first storey collapsed, upper part of the building fall onto the ground, (kachchh, 2001)

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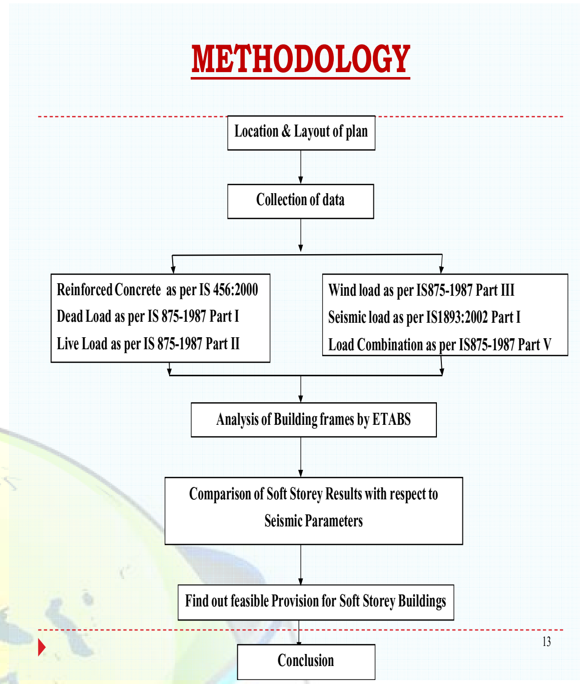
Soft Storey (Open Plinth), Vertical Split between two blocks (Bhuj)

OBJECTIVES

The Main Objects of the plan is- transport out a complete Seismic Analysis of a Hostel building with Ground Soft Storey. To investigate the authority of some parameters on behavior of a building frames with soft storey and evaluate their presentation level when subjected to quake loading. Find out some provisions to soft storey which can reduce the damage during earthquake as well as optimized w.r.t cost. Getting familiar with structural soft ware's (ETABS & Auto CAD)



1. **Location & Layout of Plan-**We can select the location, and also draw the layout of the building.
2. **Collection of data-**Collect the information in hostel structure in the district in Salem. Salem is the region of III. Earthquakes of senior intensity may be felt. While weakly designed/ built ones extensive damage. (Intensity-VII)
3. **Collection of Code book-** Also refer the code book in Reinforced Concrete as per IS-456 (2000), Dead load as per (IS 875-1987) (Part- I), Live load as per (IS 875-1987) (Part-II), Wind load as per (IS 875-1987) (Part-III), Seismic load as per (IS 1893-2002) (Part-I), Load combination as per (IS 875-1987) (Part-IV).
4. **Analysis of building frame-** The whole building is also analyzed by

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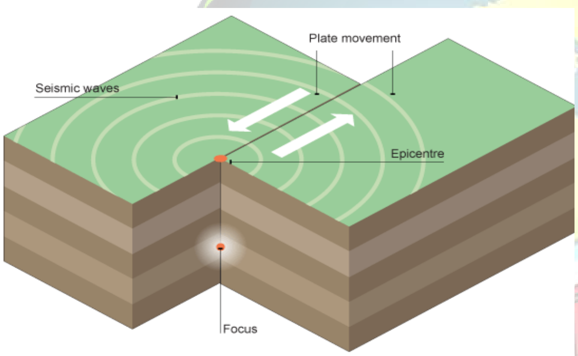
ETABS (Extended Three Dimensional Analysis of Building)

5. **Comparisons-** The winding Moment and Shear Force is also comparing by ETABS Software.

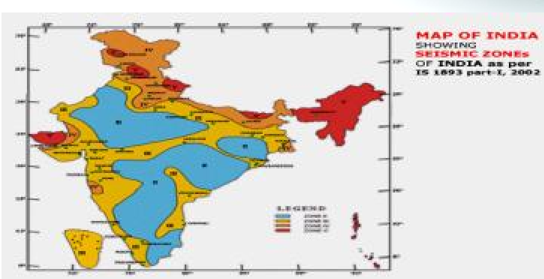
OVERVIEW OF EARTHQUAKE

An earthquake is a shaking of the earth caused by sudden breaking and group of large sections (tectonic plates) of the earth's rocky farthest crust. The edges of the tectonic plates are marked by faults (or fracture). Most earth quakes occur along the responsibility lines when the plates slide past each other or collide against each other.



Earth Quake Effects- earth quaking Ground Failure, Tsunami's, and Fire.

EARTH QUAKE ZONE MAP



EARTH QUAKE ZONES

Zone	Intensities* of Earthquakes in each Zone
II	This zone is susceptible to earthquakes that can be felt by all and may frighten people enough to run outdoors. Dishes and glassware break, books fall down, heavy furniture gets moved. Few instances of fallen plaster and **some damage to buildings** may also be observed. (Intensity: I to VI)
III	In Zone III, earthquakes of higher intensity may be felt. Earthquakes that frightens everyone, making it difficult for people to stand. Even people in moving vehicles may feel such quakes. Structures/buildings of good design and construction suffer slight damage, while **poorly designed /built ones suffer considerable damages**. (Intensity: VII)
IV	**This zone is susceptible to strong earthquakes**, which create panic all over, moving even heavy furniture. Such earthquakes could cause moderate damage in well designed/built structures/buildings, while **poorly built structures suffer great damages**. Other effects could be landslides on steep slopes, cracks in ground up to widths of a few centimetres and water in lakes could become turbid. (Intensity: VIII)
V	This is **the maximum risk zone in the country** and is **susceptible to great earthquakes.** Quakes that can cause total panic and considerable damage to life and property. Considerable damages happen **even** in specially designed structures. Great damage in buildings with partial or total collapse. Railway tracks bend and roadways get damaged; ground cracks to widths of several cm, underground pipes break, landslides, rockfalls and mud flows occur, large waves in water. Where intensities exceed XI, **total destruction** may be caused with changes in landscape that could even change the courses of rivers. (Intensity: IX and above)

* Intensity is here considered a classification of the severity of the ground shaking on the basis of observed effects in a limited area and is measured in the MSK Scale ranging from I to XII

IS CODES USED

1) **IS 456: 2000** Plain and Reinforced Concrete Code of instruction.
2) **IS: 875 (Part 1) - 1987** code of practice for plane loads (other than shaking) for building and structure. (Dead loads).
3) **IS: 875 (Part 2) - 1987** code of preparation used for Design loads (previous than quake) for building and structures. (Compulsory loads).
4) **IS: 875 (Part 5) - 1987** code of preparation for Design loads (other than quake) for buildings and structures. (Special loads and combinations).
5) **IS: 1893(Part-1)-2002** condition for quake Resistant Design of structure.
6) **IS: 1920- 1993** Ductile Detailing of Reinforced Concrete structure subjected to Seismic Forces - Code of training.

FUTURE SCOPE

The study of effect of light weight infill material can be studied in seismic response of structure. The percentage opening in infill wall can be considered while modeling the equivalent stiffness strut. We can also do analysis, Modeling of infill wall, storey displacement, storey drift, Axial forces, Bending moment, Time period by Using the software of ETABS.

CONCLUSION

RCC frame building with soft story are known to perform badly during in strong earthquake quaking. Because the stiffness at inferior floor is 70% lesser than stiffness at storey above it cause the soft storey to ensue. For a building that is not provide any lateral load resistance factor such as shear wall or bracing, the might is consider very weak and easily stop working during earthquake. In such a state, an investigation has be made to study the seismic performance of such buildings subjected to earthquake weight so that some teaching could be developed to minimize the risk concerned in such nature of building. It has been found earthquake forces by treat them as ordinary frame results in an underestimation of base shear. Investigators study numerically and use various computer programs such as Staad Pro, ETABS, and SAP2000 etc. Calculation show that, when RCC framed buildings have brick masonry infill on upper floor with soft floor floors subjected to earthquake load, base shear can be more than twice to that predicted by equivalent earthquake force method with or without infill otherwise even by response spectrum method when no infill in the analysis model. Infilled frames should be chosen in seismic region than the open primary storey frame, because the storey drift of first storey of open first storey frame is very large than the higher storey's, this may probably cause the subside of structure.

REVIEW OF LITERATURE

1) **Arnold. And Reitherman,R., (1982),** Building arrangement and Seismic plan, John Wiley, USA. Looking ahead, of course, one will maintain to make building interesting rather than repetitive. On the other hand, this need not be done at the cost of reduced behavior and shaking safety of building. Architectural features that are unfavorable to earthquake reply of structure should be avoid. If not, they must be minimizing. When unequal features are included in buildings, a significantly higher level of manufacturing effort is necessary in the structural plan and yet the structure may not be as high-quality as one among easy architectural features. decision made at the planning stage on building design are m ore important, or are known to have made better differentiation, than accurate strength of mind of code specified design forces. Resource Material.
2) **Lagorio, H, J, (1990),** Earthquake an Architect's direct to Non-Structural Seismic danger, John Wiley & Sons, Inc.,
3) **Naeim, F., Ed., (2001),** The Seismic Design manual, Kluwer educational Publishers, Boston, USA. Earthquake-resistant building, chiefly their main elements, needs to be built with ductility in them. Such buildings have the aptitude to bend back-and-forth during an earthquake, and to withstand earthquake effects with some damage, but without collapse (Figure 3). Ductility is one of the most significant may sustain severe (even permanent) damage, but

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the building should not fall down. Thus, earthquake-resistant design strives to predetermine the locations where damage takes place and then to provide good detail these site to ensure ductile performance of the building.

4) **Ambrose, and Vergun, D., (1999),** Plan for Earthquakes, John Wiley& Sons, Inc., New York.
5) **Paulay, T., and Priestley, M.J.N., (1992),** Seismic Design of Reinforced actual building and structure material. strengthen is used in masonry and concrete building as support bars of diameter ranging from 6mm to 40mm. reinforce steel can carry both tensile and compressive loads. Moreover, steel is a yielding material. This important status party of ductility enables steel bars to undergo large elongation previous to contravention. Existing is used in buildings along with steel strengthening bars. This compound material is called reinforced cement material or basically reinforced concrete (RC). The amount and place of steel in a member should be such that the breakdown of the member is by steel attainment its strength in stress before existing reaches its force in compression. This type of failure is yielding breakdown, and hence is favorite over a failure where concrete fails first in density.
6) **John Wiley, USA. Wiegel,R., (1970),** Earthquake manufacturing, Prentice Hall I Flexible buildings undergo larger relative straight displacements, which may result in injure to various n on structural building components and the contents. For example, some items in building, like glass windows, cannot take large lateral movements, and are therefore damaged severely or compressed. Unsecured shelves might topple, especially at upper stories of multi-storey buildings. These damages may not have an effect on safety of building, but may cause economic wounded, injuries and panic among its inhabitants.
7) **Chopra, A.K., (1980),** Dynamics of structure a elementary textbook, Earthquake Engineering Research Institute, USA.
8) **Mazzolani, F.M., and Piluso, V., (1996),** hypothesis and Design of Seismic-Resistant Steel Frames, E&FN Spoon, UK.